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54: Method of manufacturing a film - sheet detergent

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Specification

1. Title of invention
Method of manufacturing film - sheet detergent

2. Claims:
(2) A method of manufacturing a film - sheet detergent in which more than 10 weight parts of soap and/or surfactants was mixed with 100 weight parts of a composition consisting of water soluble natural polymer or the derivatives, hydrophilic low molecular organic plasticizer, lubricating agent and water; and moist powder or granular product is introduced into an extruder's hopper, and a film or sheet product is manufactured while kneading in a barrel of extruder.
(2) The method of manufacturing a film - sheet detergent described in the claim (1), wherein soap or surfactant is a mixture of one or more than two kinds of compounds selected from soap, higher alcohol sulfate ester, alkylarylsulfonate, monosulfate ester of fatty acid monoglyceride, fatty acid sulfonate, polyoxyethylene alkylether, fatty acid diethanol amine salt, fatty acid triethanolamine salt, alkylbetaine, alkalimetal salt or triethanolamine salt of acylglutamate.
(3) The method of manufacturing a film - sheet detergent described in the claim (1) and the claim (2), wherein water soluble natural polymer or the derivatives are a combination of alkali or alkali earth metal salts of protein materials and starch materials.
(4) The method of manufacturing a film - sheet detergent described in the claim (1) or the claim (2), wherein water soluble natural polymer is a combination of sodium casein and corn starch containing more than 50 % of amylose.
(5) The method of manufacturing a film - sheet detergent described in the claim (1), (2), (3) or (4) , wherein hydrophilic low molecular weight organic plasticizing agent and the lubricating agent are glycerine and soy bean phospholipids, respectively.

3. Detailed explanation of the invention

The present invention refers to a method of manufacturing a film or sheet detergent . In other words, the present invention relates to a method of manufacturing a film - sheet detergent having a proper water dispersibility or solubility, softeness, mechanical strength and fine usability.

It is well known there are so called paper soaps which are prepared by drying a paper having a fine water dispersibility which has been treated with a detergent solution. Although the said paper-soap is destructed during use, the usability is not quite satisfactory since water insoluble cellulose ( short fiber ) is essentially employed as the base, and the residual material after use must be removed.

In order to solve the said problems, a few methods have been proposed; for example, water soluble polymer such as cellulose ether, polyvinylalcohol, polyvinylpyrrolidone, etc. and the detergent are dispersed or dissolved in water, and the sheet is casted on a heated drum to form a film - sheet detergent, and so on. However, in case of employing the said method, a large amount of water must be removed during a manufacturing process. As the latent heat of evaporation of water is extremely large, a large amount of energy is required. Moreover, although it is possible to prepare the film - detergent using highly water soluble detergent, it is practically impossible to prepare the said detergent using poorly water soluble detergents. Furthermore. as the film - sheet detergent obtained by the method described above utilizes synthetic polymer solution ( aqueous solution ), the rate of solubilization is extremely slow, and a highly viscous product gives an ill-feeling for handling. When the humidity is high, the film - sheet products tend to clump together. As the said sheet detergent contains synthetic polymer, the biodegradability of the product is also poor, and the laundering water containing such product may cause water pollution in public water zones.

One of the methods of promoting the water solubility of the product during laundering is to use porous film - sheet made of methyl cellulose, and the actual product utilizing the said method has been introduced on the market. Although the water solubility of the said product has been improved signifivantly, other problems exist without correcting. Consequently, useful film - sheet detergent products showing excellent activities even if the water solubility is poor has not yet introduced.

The present inventors have made great efforts to improve these short points under the said circumstance. As a result, the present invention was accomplished. In other words, a detergent is added to a composition consisting of natural polymer compounds or their derivatives, hydrophilic low molecular weight organic plasticizers, lubricating agents, and water and a film - sheet material is prepared by extruding the said composition. When the said film - sheet detergent product is prepared by the said method, problems described above have been corrected. Thus, the film - sheet detergent showing excellent activities was manufactured.

The key factors of the present invention are explained in the following.

(1) Since the film - sheet detergent product is prepared by dry type extruder, the mass production of the sheet can be easy.



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(2) As an aqueous solution of the detergent is not required for making a film - sheet, pooly water soluble detergents showing excellent activity can be used, and at the same time, a combination of various kinds of detergents exhibiting different kinds of activities can be used. In this case, various kinds of final products can be manufactured.
(3) As the said product uses water soluble natural polymer materials, the viscosity of the solution is not high ( unlike synthetic polymers ). In this case, the rate of solubilzation in water becomes high.
(4) Since an extruder is used for making a sheet or film, various thickness of film or sheet can be manufactured freely and easily.
(5) As the surface of the film - sheet is smooth, a printing utilizing water soluble ink can be made easily.
(6) As the biodegradability of the product is excellent, no problems of pollution are expected.
(7) As the product is natural polymer, the irritative action on the skin is very small.
The present invention shall be explained in details in the following.
Water soluble natural polymers and their derivatives used in the present invention are protein materials such as collagen, casein, glue, gluten, albumin, gelatin, sodium caseinate, etc. or amlaki or alkali earth metal salts of these compounds or their derivatives, starches isolated from grains, beans, potatos, etc., dextrin, oxidized starch, alpharized starch, high amylose starch, high amylose pectin starch, etc. or other other starcg compounds, or therified compounds, esterified compounds, phosphorated compounds; cellulose products such as carboxymethylcellulose, cellulose ether, hydroxyethylcellulose, etc.; natural carbohydrates such as sodium alginate, mannan, gum arabic, gum tragacanth, pluran, curdran, dextran, etc., natural gums, or mixture of these compounds. Among these compounds, especially a combonation of starch compounds and alkali or alkali metal salts of protein compounds ( starch - protein dimentional compounds ) may be preferable from the aspects of molding characteristics and processability as the film - sheet detergent products. In case of considering the anti-blocking activity, a combination of corn starch containing more than 50 % of amylose and sodium casein is excellent selection for the present purpose. In case that the concentration of amylose is small, a blocking may be generated under high humidity conditions.
In order to improve the flexibility and the processability of the said film - sheet detergent product, hydrophilic low molecular weight organic plasticizers represented by glycerine, sorbitol, mannitol, maltitol, etc. can be used in the present invention. In general the first choice is glycerine. Especially in case of using a starch - protein dimentional composition, an addition of glycerine is preferable from the aspects of improving the processability, anti- bleeding activity against plasticizer at high humidity, antifragility action under low humidity, anti-blocking activity and so on. It is essential to add a lubricant in order to improve the processability in the extruder. The lubricants are higher fatty acids such as stearic acid, etc., higher fatty acid esters such as

polyhydric alcohols, tc.; phospholipids, etc. In case of considering the biodegradability of the composition, it is preferable to use phospholipids.

The detergents are usually added to the said composion. The detergents are any kinds of conventional detergent compositions. The following detergents are frequently employed in the present invention in case of using the said compounds for various purposes, and more than two kinds of such compounds can be combined. In this case, a film - sheet detergent product expressing various functions cam be manufactured.

The detergeents are soap, higher alcohol sulfate esters, alkylarylsulfonate, fatty acid monoglycerides - monosulfate esters, fatty acid sulfonate, polyoxyethylene alkylether, fatty acid diethanolamine salt, alkylbetaine, acyl glutamate (alkali or alkali metal salts ) and so on.

Among these compounds, the preferable compound may be acylglutamate type detergents from the aspect of low irritative action on the skin. However, as the water solublity of the said detergent product is small, a film - sheet making process for a film - sheet detergent containing a sufficient amount of the said detergent has been impossible to be carried out by the conventional manner. However, it became possible by utilizing the method described in the present invention.

The concentration of the said detergent in the said composition is at least 10 weight parts per 100 weight parts of the composition. When the concentration of the detergent is less than 10 weight parts , the sudsing ability and the detergency of the product are reduced significantly, and no function as the detergent may be expected.

As described above, the composition consisting of water soluble natural polymer materials or their derivatives, hydrophilic low molecular weight organic plasticizers, lubricants, water and detergent is mixed uniformly and then is introduced into the extruder. The method of mixing the said composition can be carried out various conventional methods. In other words, the mixing can be achieved by a simple stirring and blender, mixing and kneading roll, pressurized kneader, heating and kneading units, etc. After kneading and cooling, the composition may be pulverized or made into granules. In case of utilizing the latter method, the powder or granular materials may be charged uniformly from the hopper of extruder and the said procedure may be preferable from the aspects of the moderation of extruding and kneading conditions and uniformity of extruded products.

The material is charged into the extruder and is heated in the extruder which has been heated at 100° C or higher, and then, a sheet of desired thickness can be prepared through a dice. Thus, a film - sheet detergent product of a desired thickness can be manufactured.

The product can be used directly as the film-sheet product. However, in case of promoting the value of marchandize, the printing treatment may be provided on the sheet because the surface of the said film-sheet detergent product is very smooth. In this case, water soluble or dispersible ink may be used for printing the said film - sheet detergent product.

The present invention shall be explained in details in the following typical practical examples. However, the scope of the present invention

shall not be limited to these practical examples.

Practical example 1:

| | |
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| corn starch containing high amylose (the concentration of amylose was 60 weight %.) | 40 weight parts |
| sodium caseinate | 50 weight parts |
| glycerine | 50 " |
| sorbitol | 10 " |
| soybean lecithin | 5 " |
| water | 20 " |

The ingredients listed above were mixed and a slightly moistened powder mixture was obtained. To the said mixture, 80 weight parts of sodium salt of lauryl sulfate ester and small amount of perfume and coloring agent were added. After mixing, a powder composition was obtained. The said composition was kneaded using a kneading roll, whereas the surface temperature was set at 80° C, and a sheet was prepared. After cooling, the sheet was pulverized using an impact type pulverizer.
Then, the said powder composition was introduced into an extruder having Darmage type screw of 18 in the compression ratio, and the composition was extruded under the following conditions: 60 rpm in the rotary speed, 120 - 160° C in the inner cylinder temperature, 120° C in the dice temperature, 0.1 m/m in the die slip gap. The extruded sheet was extended by a pulling unit and a film detergent of 60 microns in the thickness was obtained. The film detergent product obtained by the method described above was a film containing uniformly the detergent and the binder materials, and showed an excellent water solubility, sudsing ability and detergency.

Practical example 2:

| | |
|---|---|
| corn starch containing high amlose | 60 weight parts |
| alpharized (gelatinized) potato starch | 10 " |
| casein | 20 " |
| aqueous solution of sodium hydroxide (solubilizing agent for casein) | 5 " |
| water | 30 " |
| glycerine | 50 " |
| sucrose fatty acid ester | 5 " |

Ingredients listed above were mixed and 100 weight parts of sodium lauryl sulfate, 50 weight parts of sodium acylglutamate and small amount of perfume were added to the said mixture. After mixing thoroughly, a powder composition was obtained.
The powder composition was treated in the same manner as described in the practical example 1, and a pellet product ( 3 m/m in the diameter and 6 m/m in the length ) was obtained.
The said pellet was subjected for extruder treatment under the same conditions described in the practical example 1, and a film detegent product of 80 microns in the thickness was obtained.



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The film detergent product prepared by the method described above demonstrated an excellent detergency, and sudsing ability, and showed no skin irritation.

Practical example 3:
A screen print was applied on the surface of film - sheet detergent obtained in the practical example 1 and the practical example 2, whereas the surface of the said film - sheet detergent was very smooth, and the print employed printing ink containing maleinated rosin as the vehicle. The printed sheet was dried at 60° C. Thus, a film detergent showing a clear picture on the surface was obtained. The film detergent was used in the actual laundering test. In this case, the printed picture was dissolved simultaneously when the film was dissolved. Therewas no abnormal sensation of using the film detergent and the value of marchandize as the film detergent was considerably good.